

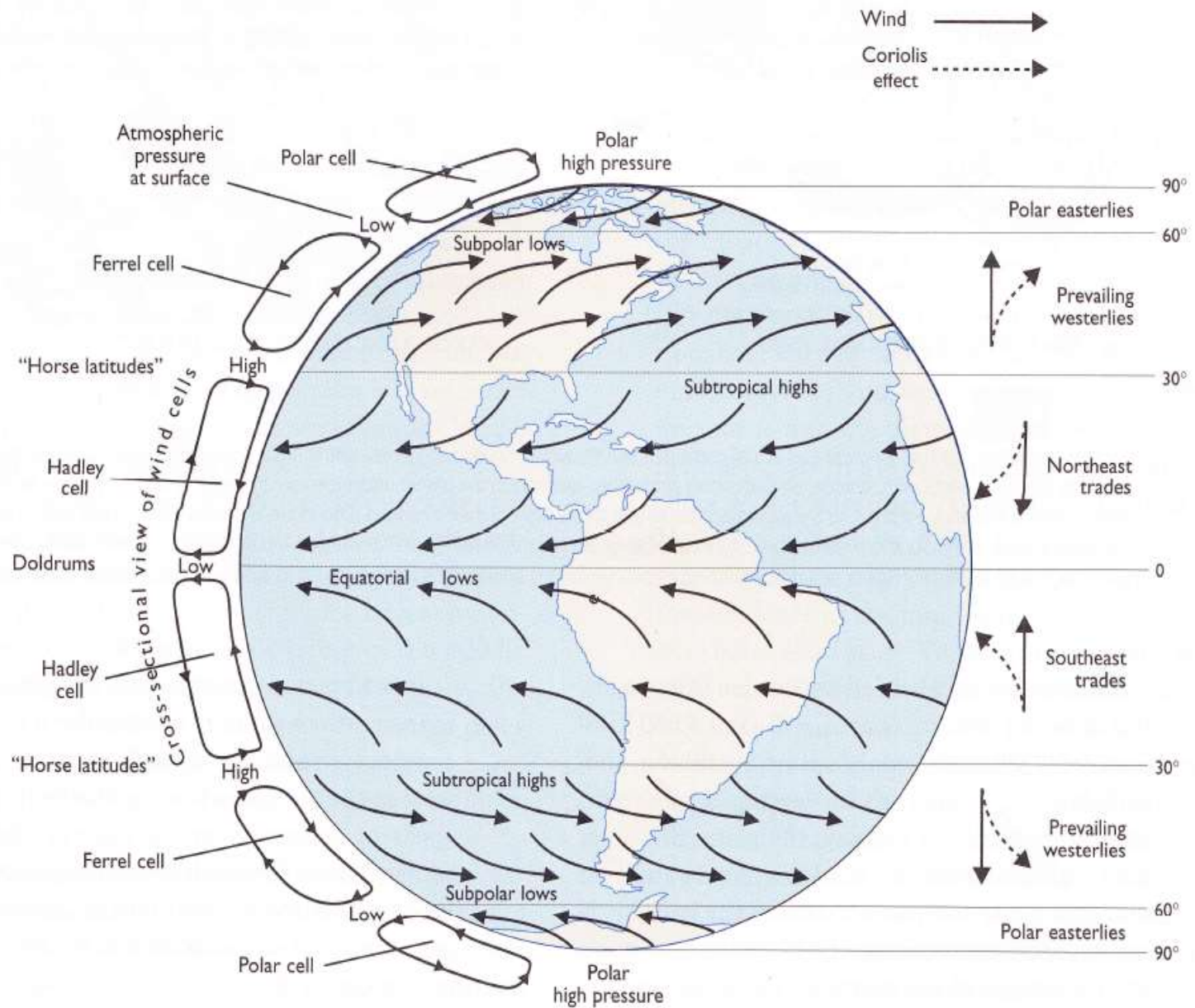
ENSO

El Niño

- Oceanic and atmospheric phenomenon in the Pacific Ocean
- Occurs during December
- 2 to 7 year cycle
 - ❑ Sea Surface Temperature
 - ❑ Atmospheric Winds
 - ❑ Upwelling

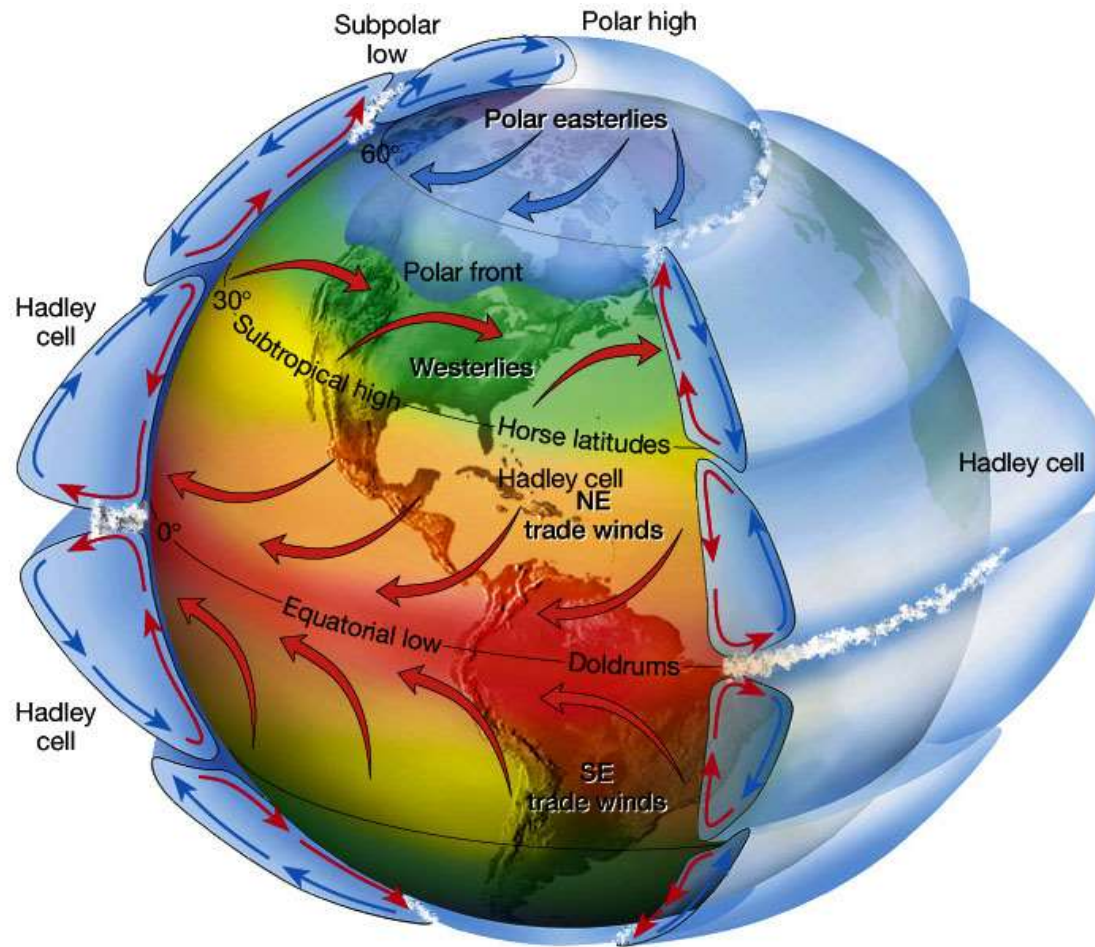
El Niño-Southern Oscillation (ENSO)

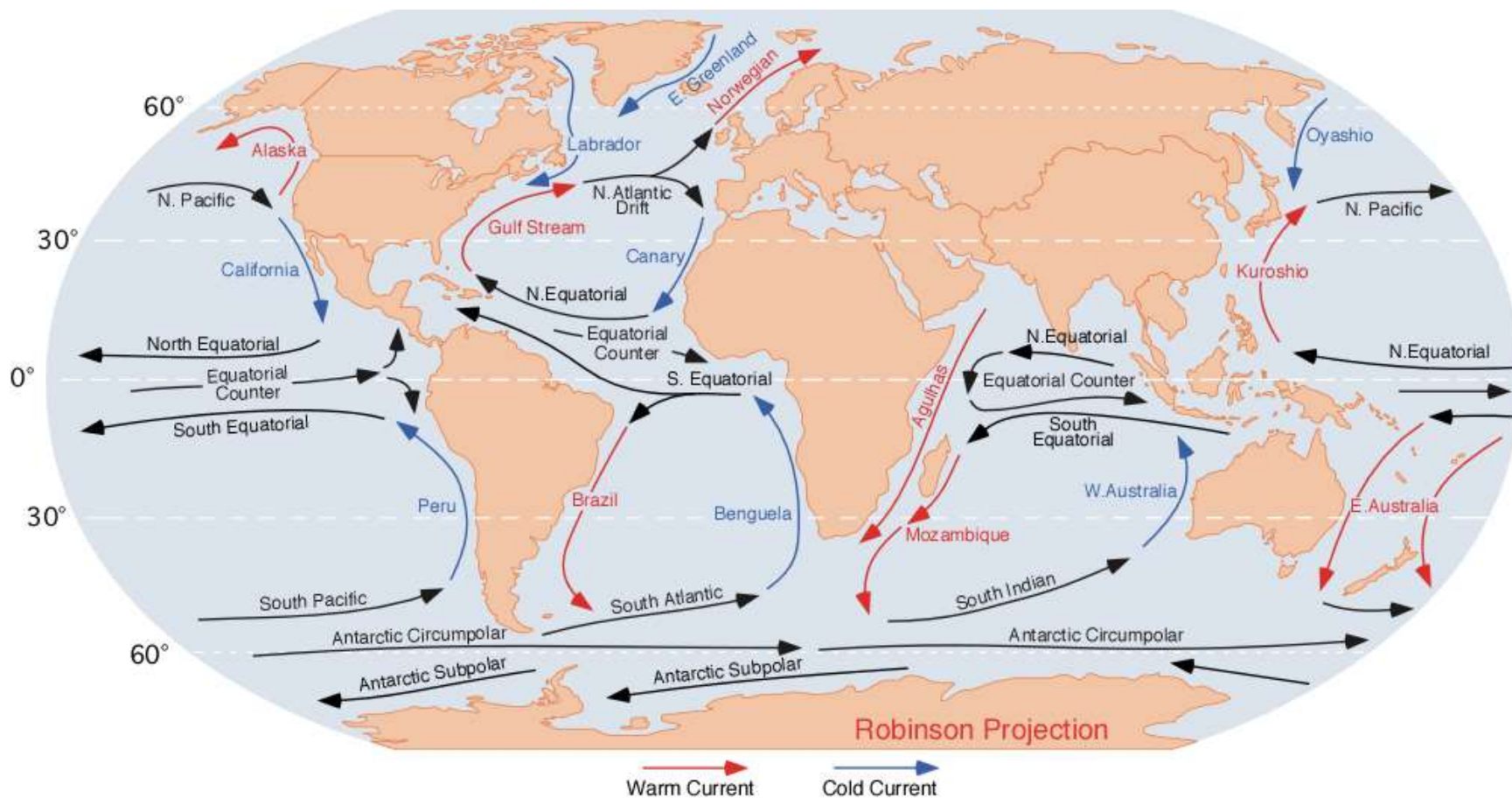
- **El Niño** = warm surface current in equatorial eastern Pacific that occurs periodically around Christmastime
- **La Niña** = a cooling of the water in the equatorial Pacific, which occurs at irregular intervals, and is associated with widespread changes in weather patterns complementary to those of El Niño, but less extensive and damaging in their effects.
- **Southern Oscillation** = change in atmospheric pressure over Pacific Ocean accompanying El Niño
- **ENSO** describes a combined oceanic-atmospheric disturbance

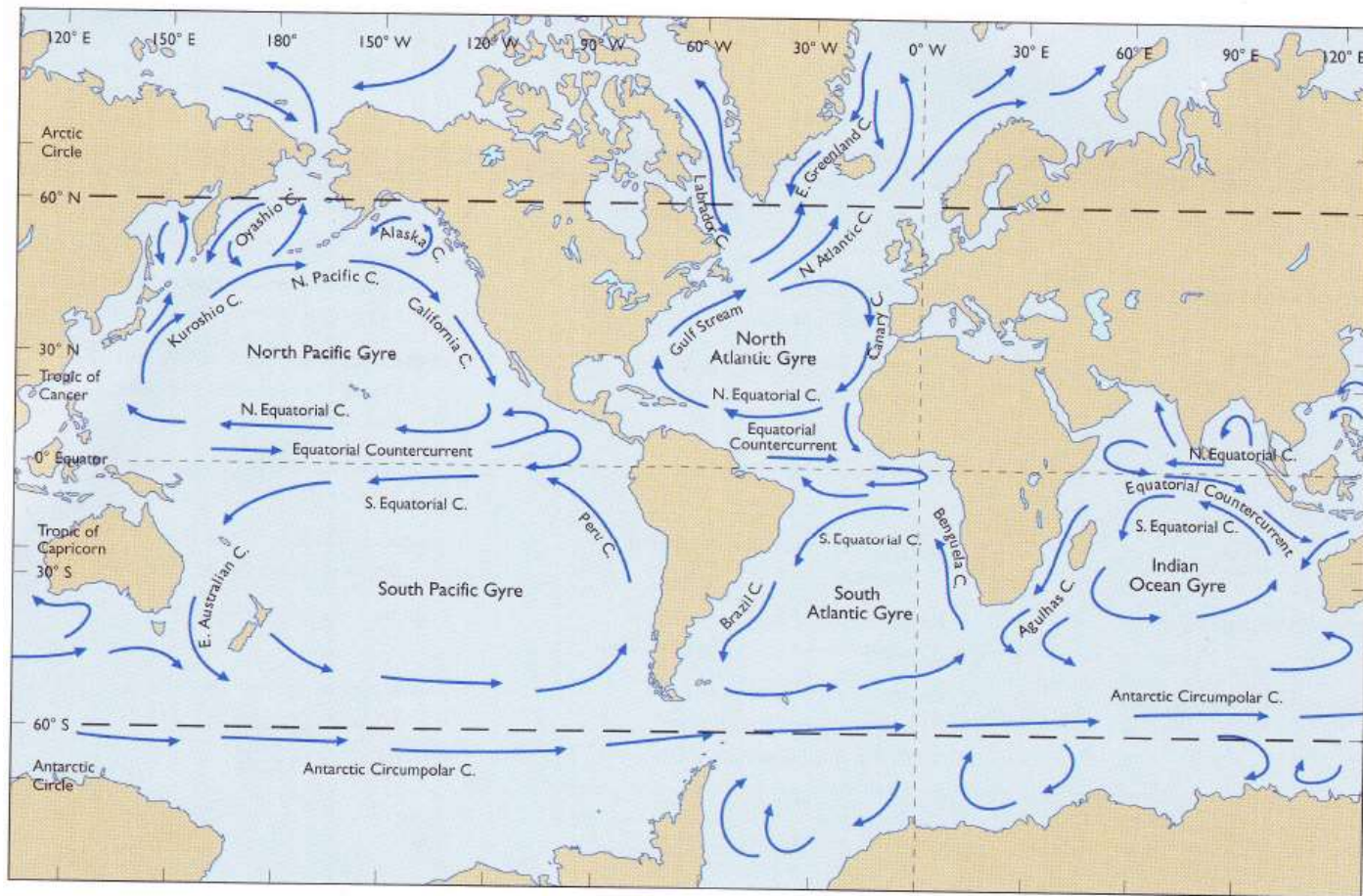


(a) GLOBAL WIND PATTERN

Add rotation and add landmasses
unequal heating and cooling of the Earth



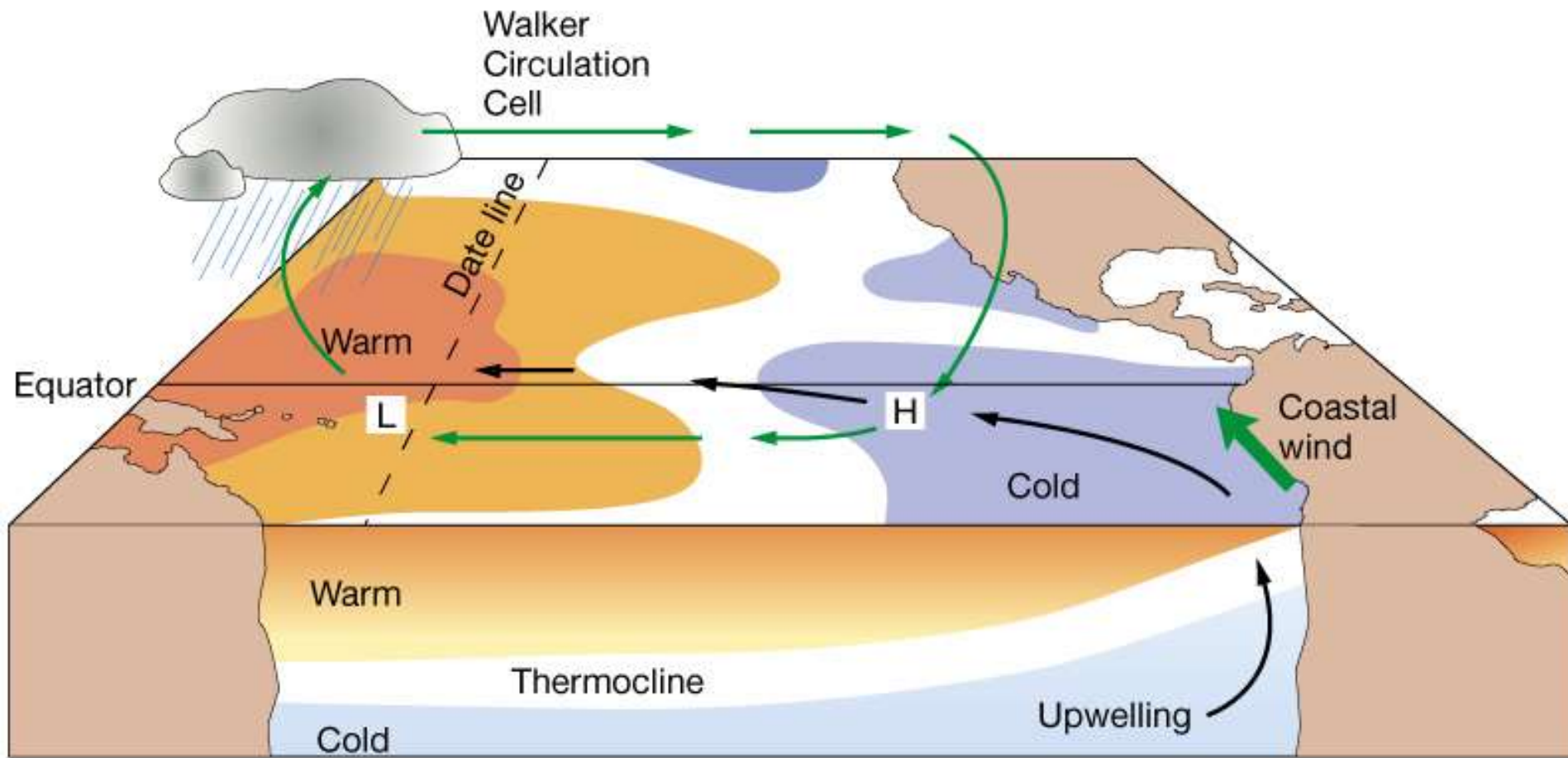




Normal conditions in the Pacific Ocean

- Air pressure across equatorial Pacific is higher in eastern Pacific
- Strong southeast trade winds
- Pacific warm pool on western side
- Thermocline deeper on western side
- Upwelling off the coast of Peru

Normal conditions in the Pacific Ocean

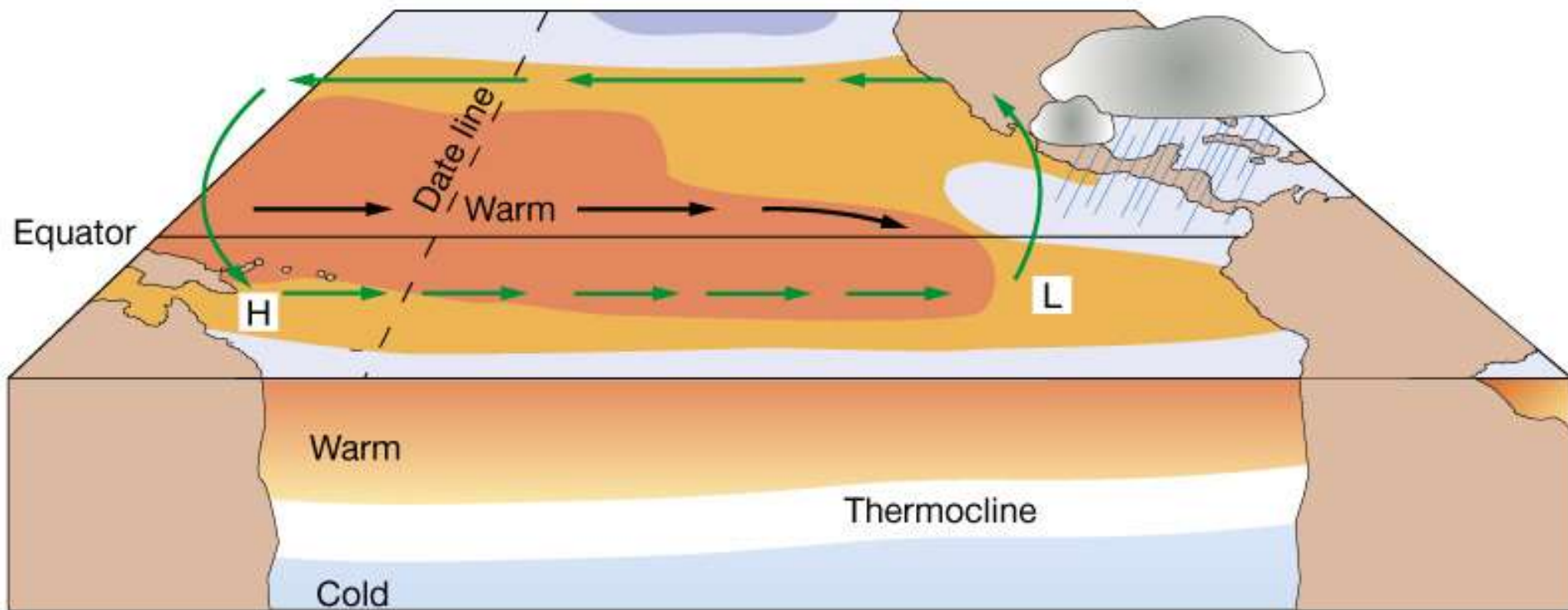


(a) Normal conditions

El Niño conditions (ENSO warm phase)

- High pressure in eastern Pacific weakens
- Weaker trade winds
- Warm pool migrates eastward
- Thermocline deeper in eastern Pacific
- Downwelling
- Lower biological productivity
 - Corals particularly sensitive to warmer seawater

El Niño conditions (ENSO warm phase)

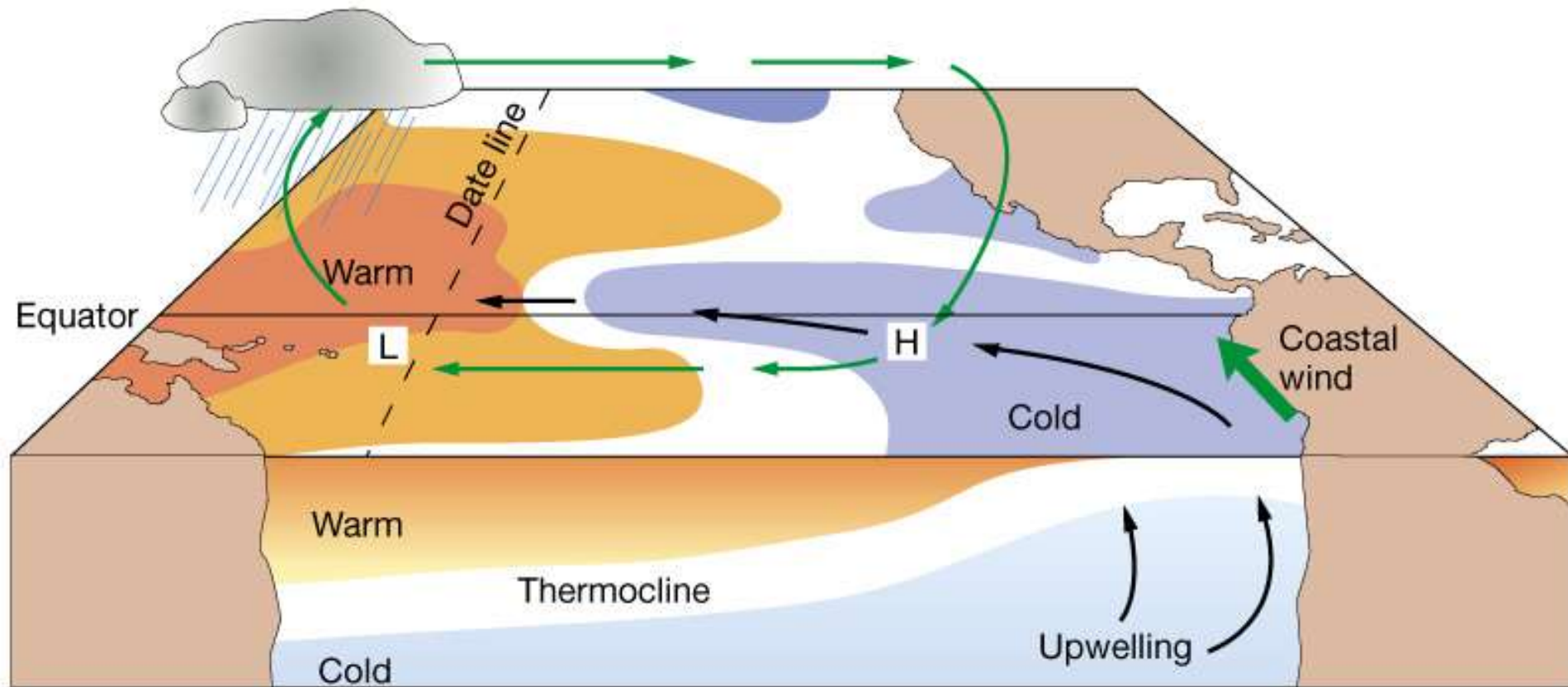


(b) El Niño conditions

La Niña conditions (ENSO cool phase; opposite of El Niño)

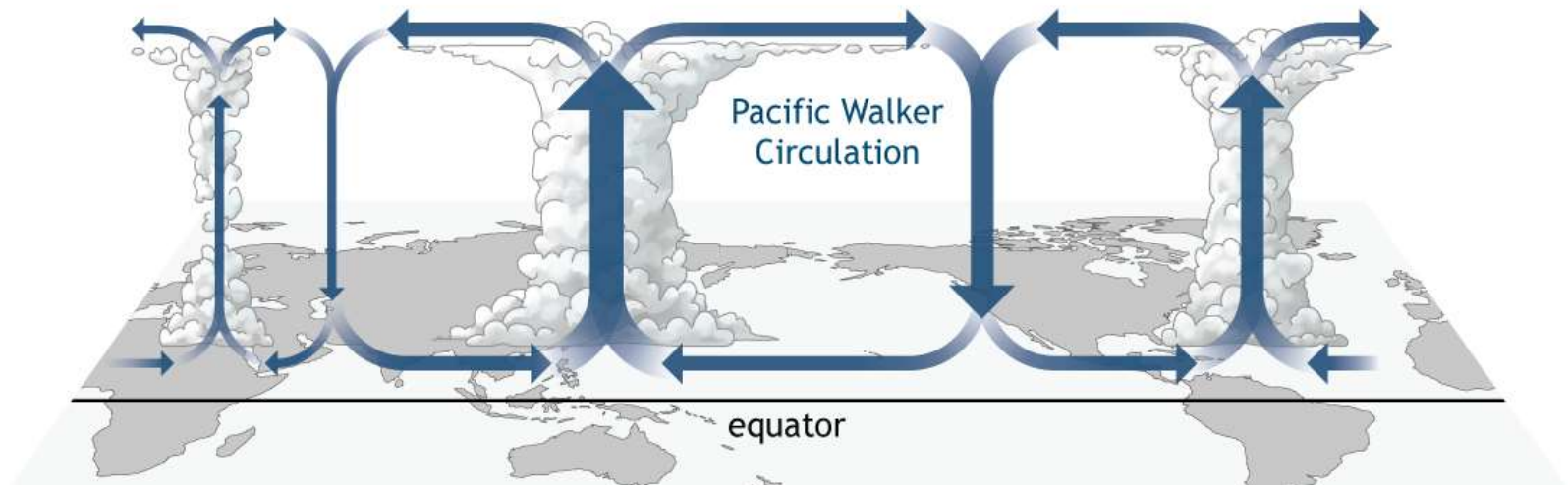
- Increased pressure difference across equatorial Pacific
- Stronger trade winds
- Stronger upwelling in eastern Pacific
- Shallower thermocline
- Cooler than normal seawater
- Higher biological productivity

La Niña conditions (ENSO cool phase; opposite of El Niño)

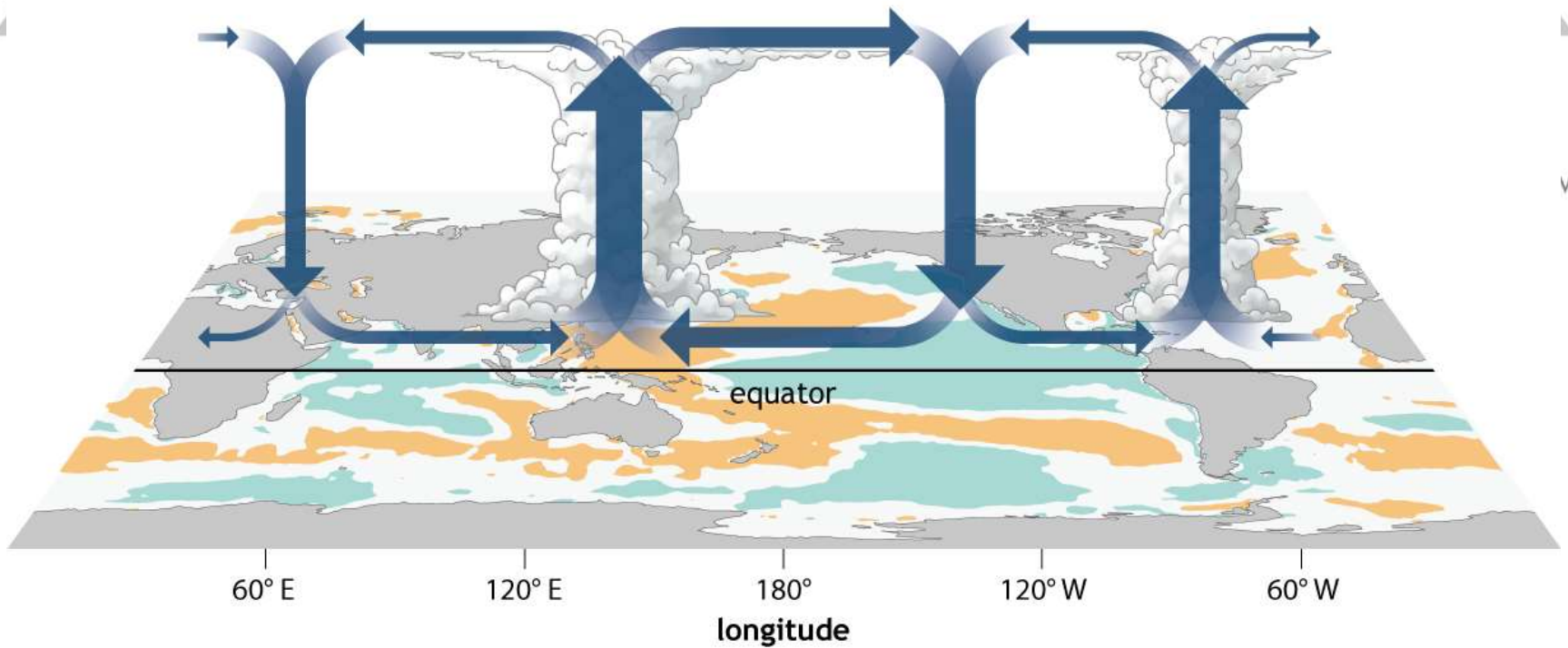


(c) La Niña conditions

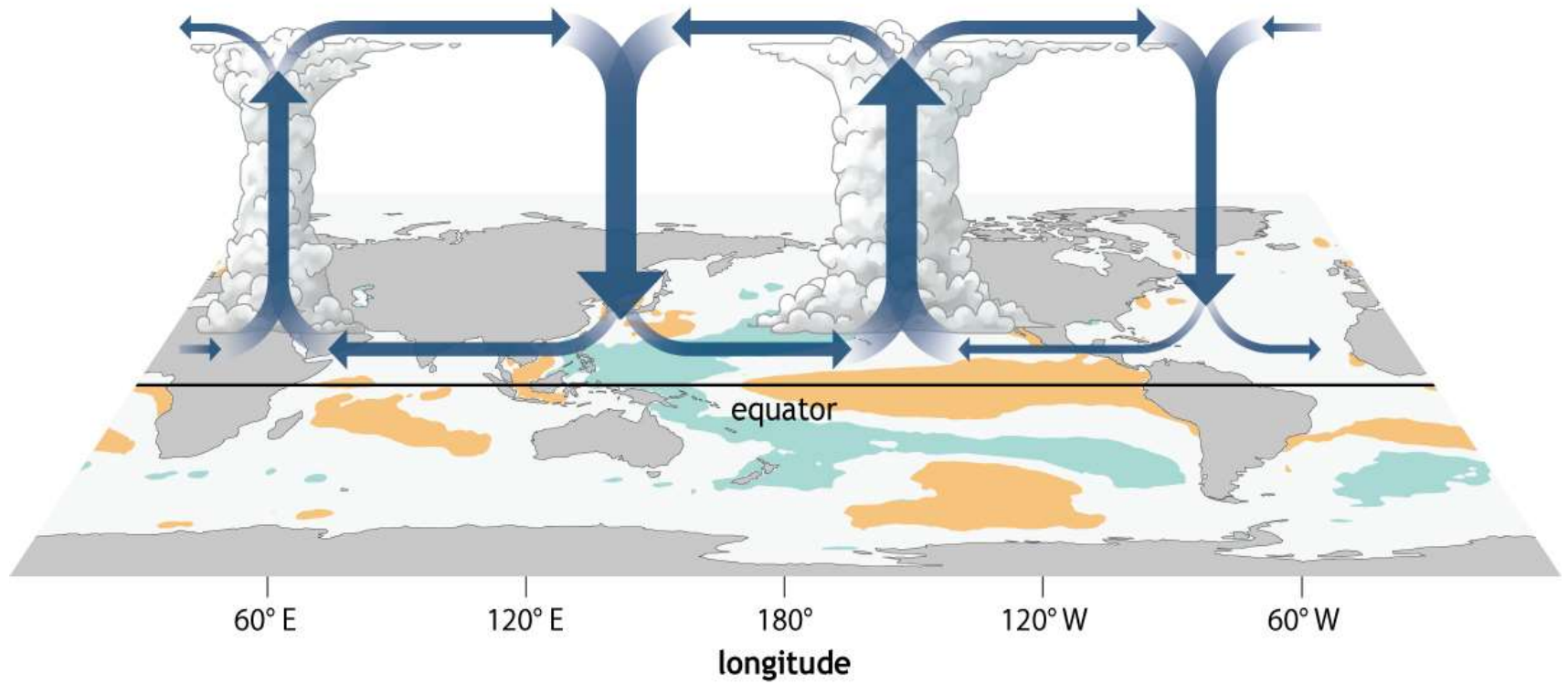
Neutral conditions



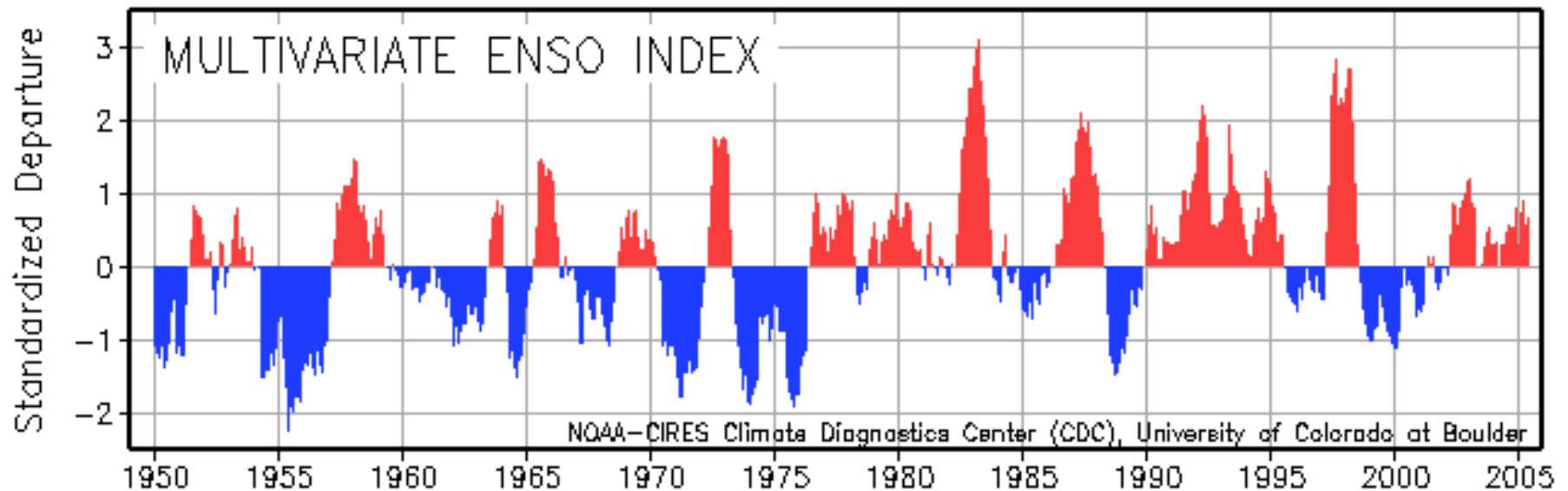
La Niña conditions



El Niño conditions

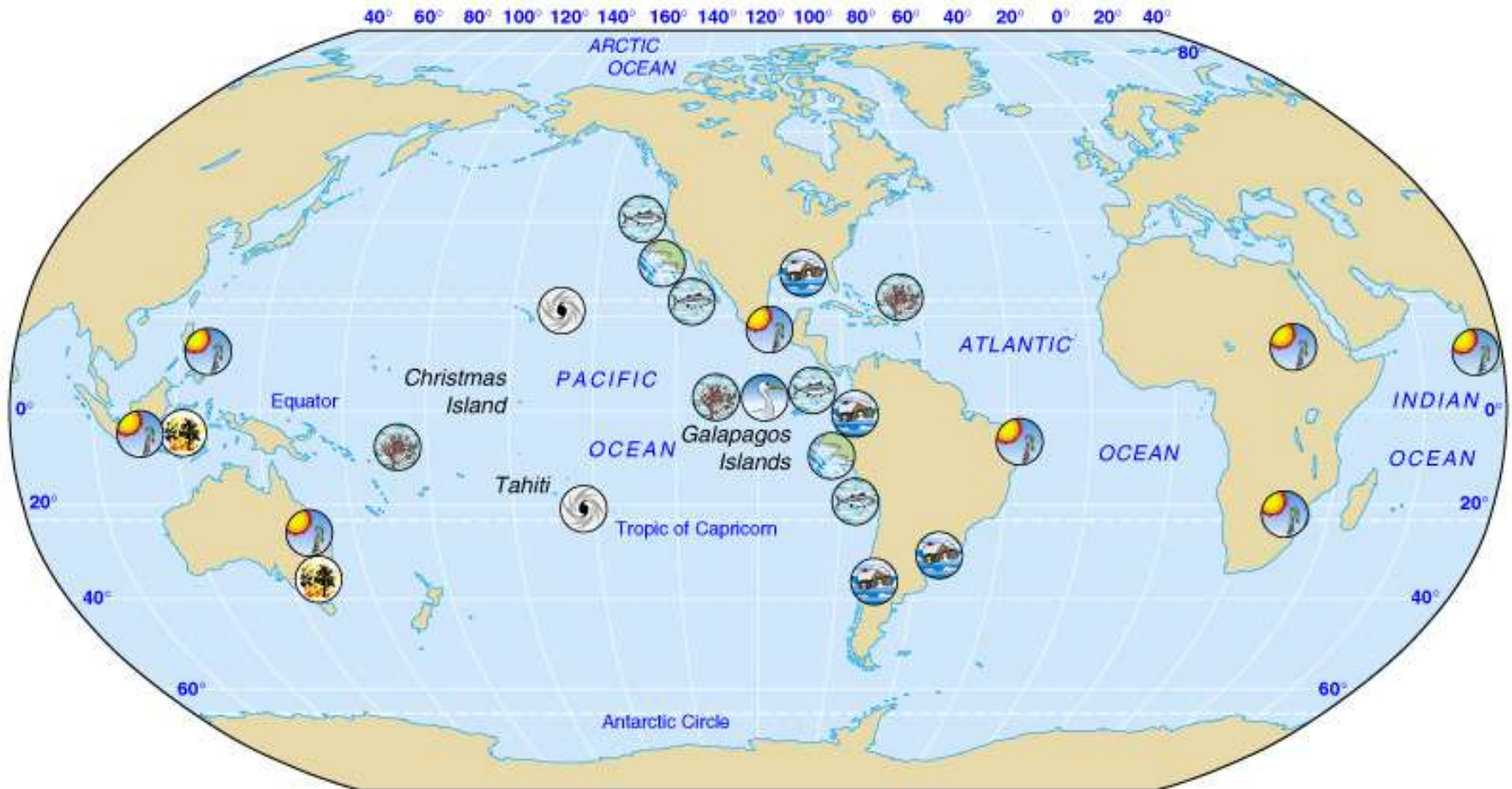


El Niño events over the last 55 years



El Niño warmings (red) and La Niña coolings (blue) since 1950. Source: [NOAA Climate Diagnostics Center](#)

Effects of severe El Niños



Marine life impacted



Coastal Erosion



Coral reef damage



Forest Fires



Floods



Drought



Bird life impacted



Tropical Storms